

## CLAIMS

We claim:

1. A transformer apparatus, comprising:  
a transmission line transformer having an electrical length;  
a fluid dielectric; and  
a fluid control system for selectively moving said fluid dielectric from a first position, where said fluid dielectric is electrically and magnetically coupled to said transmission line transformer to produce a first impedance transformation, to a second position, thereby producing a second impedance transformation distinct from said first impedance transformation.
2. The transformer apparatus according to claim 1 wherein said electrical length is approximately equal to an integer multiple of a one-quarter wavelength at a design operating frequency.
3. The transformer apparatus according to claim 1 wherein at least one electrical characteristic of said transmission line transformer is changed when said fluid dielectric is moved from said first position to said second position.
4. The transformer apparatus according to claim 3 wherein said electrical characteristic is a characteristic impedance of said transmission line transformer.
5. The transformer apparatus according to claim 1 wherein said fluid control system includes a pump for moving said fluid dielectric between said first position and said second position.
6. The transformer apparatus according to claim 5 wherein said first position is defined by a bounded region located adjacent to said transmission line transformer and said second position is defined by a fluid storage reservoir.

7. The transformer apparatus according to claim 6 wherein said bounded region is bounded by at least one of a solid conductive material and a solid dielectric material.

8. The transformer apparatus according to claim 1 wherein said fluid control system is responsive to a control signal for selectively moving said fluid dielectric between said first and second position.

9. The transformer apparatus according to claim 1 wherein said fluid dielectric is comprised of an industrial solvent.

10. The transformer apparatus according to claim 9 wherein said industrial solvent has a suspension of magnetic particles contained therein.

11. A method for dynamically controlling an impedance transformation characteristic of a transmission line transformer, comprising the steps of:

transforming a first impedance connected at a first end of said transmission line transformer to a second impedance at a second end of said transmission line transformer; and

responsive to a control signal, transforming said first impedance to a third impedance at said second end of said transmission line transformer by moving a fluid dielectric from a first position, where said fluid dielectric is electrically and magnetically coupled to said transmission line transformer, to a second position.

12. The method according to claim 11 further comprising the step of selecting a permittivity and a permeability of said fluid dielectric to provide a desired impedance transformation when said fluid dielectric is moved from said first position to said second position.

13. The method according to claim 11 further comprising the step of selecting said transmission line transformer to have an electrical length equal to an integer multiple of about one-quarter wavelength at a design operating frequency.

14. The method according to claim 11 further comprising the step of operating a pump to move said fluid dielectric from said first position to said second position.

15. The method according to claim 12 further comprising the step of selecting said first position to be a bounded region located adjacent to said transmission line transformer and selecting said second position to be a fluid storage reservoir spaced apart from said transmission line transformer.